



Commentary

Radiomics: The endocrinologists' new best friend?

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We have read with great interest the study by Shi et al. investigating adipose tissue textures in patients with metabolic diseases and weight loss after metabolic surgery [1]. They used abdominal computer tomography (CT) slices to assess volume and textures of visceral and subcutaneous adipose tissue. Using machine learning and neuronal networks to identify clinical and CT-based markers (radiomics), Shi et al were able to identify patients developing metabolic disease with a high predictive value. Furthermore, a combination of different radiomic markers were able to predict weight loss after bariatric surgery. The most important radiomic parameter identified was “runentropy”, which is defined as “the uncertainty/randomness in the distribution of run lengths and gray levels”.

This study investigated an important and relevant topic. Traditional parameters used for metabolic health such as weight, body mass index (BMI) and others are unreliable and do not accurately predict survival and development of metabolic diseases. Sharma et al. showed years ago that BMI is a poor predictor for survival and therefore proposed the Edmonton Obesity Staging System to identify patients at risk for detrimental outcomes due to obesity associated diseases [2,3]. Similarly, several other studies showed that obese patients can be metabolically healthy while lean patients can have a high cardiovascular risk [4,5]. Therefore, it is of paramount interest for the treatment of metabolic diseases to reliably identify the patients having the highest risk for cardiovascular events or development of microvascular complications and, consequently, benefiting the most from an early intervention. This study presents an important step in this direction.

However, there are also several points that must be addressed in future studies. The patients in this study were relatively healthy, even the patients in the group with obesity and metabolic syndrome. Average HbA1c levels were normal in the obese patients and there were no separate data on patients with more severe metabolic disease. Similarly, while the authors mention that radiomics was able to

differentiate patients with and without type 2 diabetes and non-alcoholic fatty liver disease, there were no detailed information on these subgroups provided. Furthermore, there were also no detailed information on the patients undergoing bariatric surgery regarding preoperative BMI and comorbidities as well as remission of the comorbidities and the predictive value of radiomic assessment for remission of comorbidities.

To use radiomics in daily practice, the results of this study must be validated in a wide variety of patients with varying severity of type 2 diabetes and over a wide BMI-range. Furthermore, it would be important to assess whether the radiomic parameters chosen can be used to assess the risk for cardiovascular events and other detrimental events in metabolically sick patients. Early identification of patients with a high risk for cardiovascular events and other complications of their metabolic disease such as nephropathy and liver cirrhosis is of paramount interest for best care. If radiomics is predictive for complications of metabolic diseases, a specific treatment, be it medically or surgically, can be started early since the effectiveness of treatments for metabolic disease, such as metabolic surgery, is higher the earlier it is started [6]. It should also be investigated whether radiomics maintain their predictive value after treatment of metabolic diseases. In the current manuscript, only the improvement of insulin resistance as a metabolic endpoint after metabolic surgery was analyzed. The biggest value of the proposed radiomics would be to predict detrimental metabolic outcomes and treatment response.

Another open question is which changes in the adipose tissue are detected by these CT-based parameters. The parameter described as “run entropy” seems to be in line with the changes observed in adipose tissue of patients with advanced metabolic disease. Several studies showed that insulin resistance is associated with increased adipose tissue fibrosis and in particular with changes in the omental fat. The findings described in this study also found that the omental fat changes have a stronger predictive value than subcutaneous fat changes [7–10]. Since more advanced metabolic disease is associated with stronger changes in the adipose tissue, it seems possible that the CT-based parameters may be able to differentiate also patients with more advanced metabolic disease than the patients investigated in the current study [10].

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Studies like this present an important step towards a better understanding of metabolic diseases and offer the opportunity for more personalized care in patients with metabolic diseases.

Declaration of Competing Interest

The authors have no conflict of interest to disclose.

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